Water Quality Monitoring In Michigan: Design Considerations For Achieving Multiple Goals

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Monitoring Strategy

- Completed in January 1997
- Identified a comprehensive list of monitoring activities with cost estimates
- Strategy provides overview of study designs; details were developed based on specific goals and objectives
- Implementation primarily through grants and contracts

Four Monitoring Goals

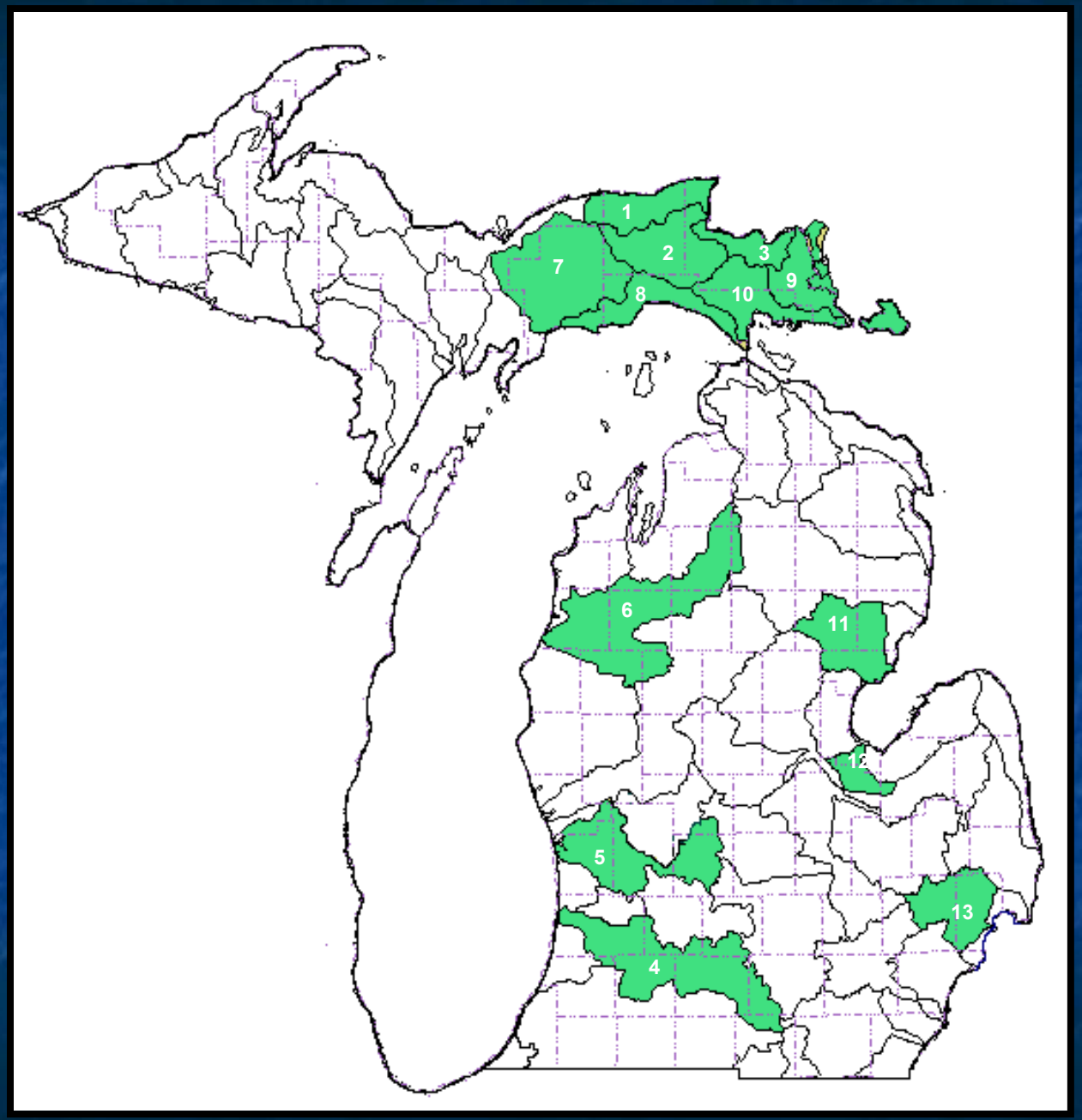
- Assess the current status and condition of individual waterbodies and determine whether MI Water Quality Standards are being met
- Measure temporal and spatial water quality trends
- Provide data to support DEQ water quality protection programs and evaluate their effectiveness
- Detect new and emerging water quality problems

Water Quality Monitoring Program Elements

- Fish Contaminants
- Water Chemistry
- Sediment Chemistry
- Biological Integrity
- Wildlife Contaminants
- Beach Monitoring
- Volunteer Monitoring
- Lake Water Quality Assessment
- Stream Flow

Status/Condition

- 5-year rotating basin
- Targeted (approaches census over 5 years)
  - water, sediment, biological, fish contaminants
- Census
  - wildlife contaminants
- Random/Probabilistic
  - inland lake quality assessment
  - partnerships with EPA (fish, benthos, habitat)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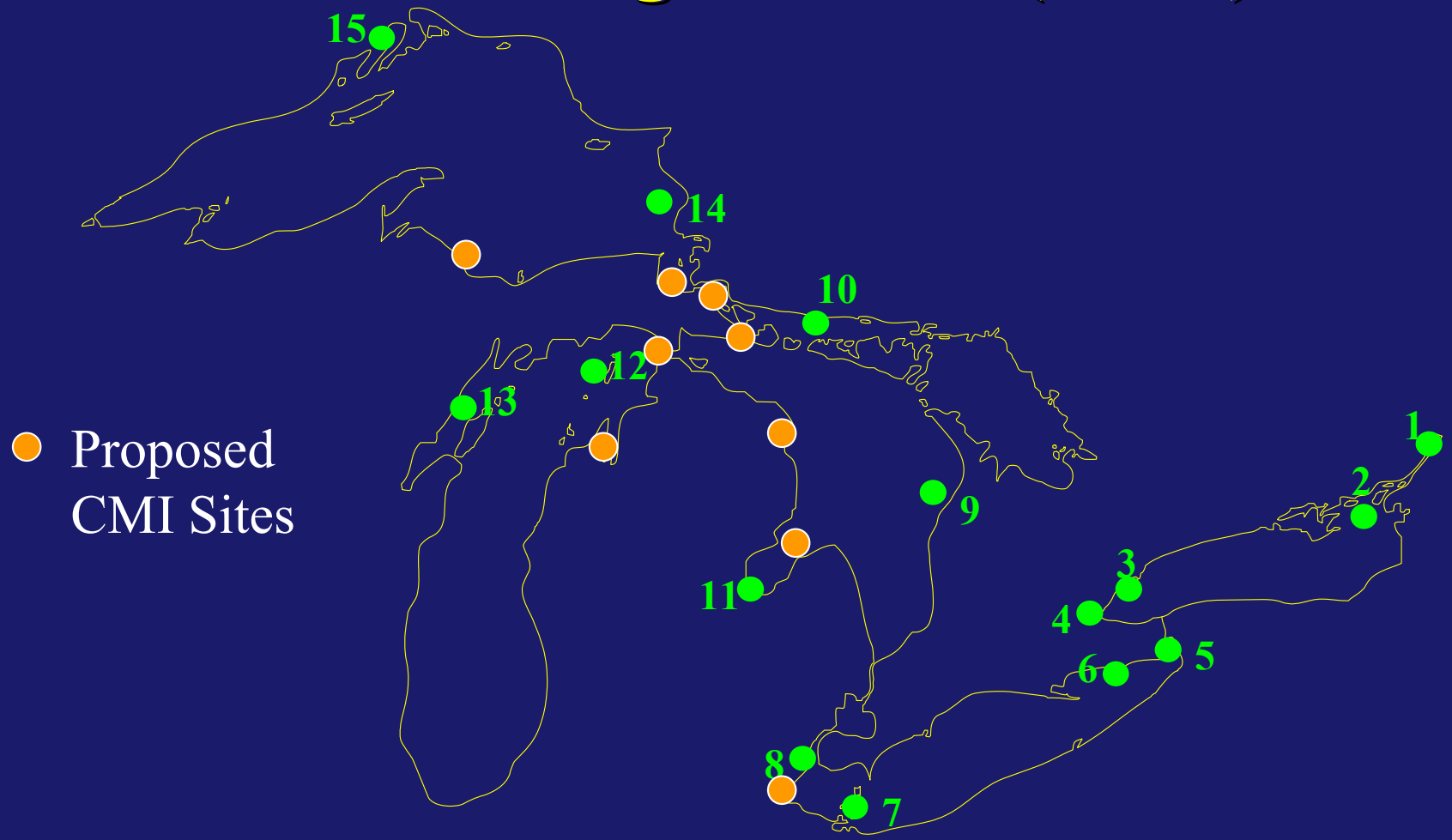
Locations of Herring Gull Annual Monitoring Colonies (CWS)

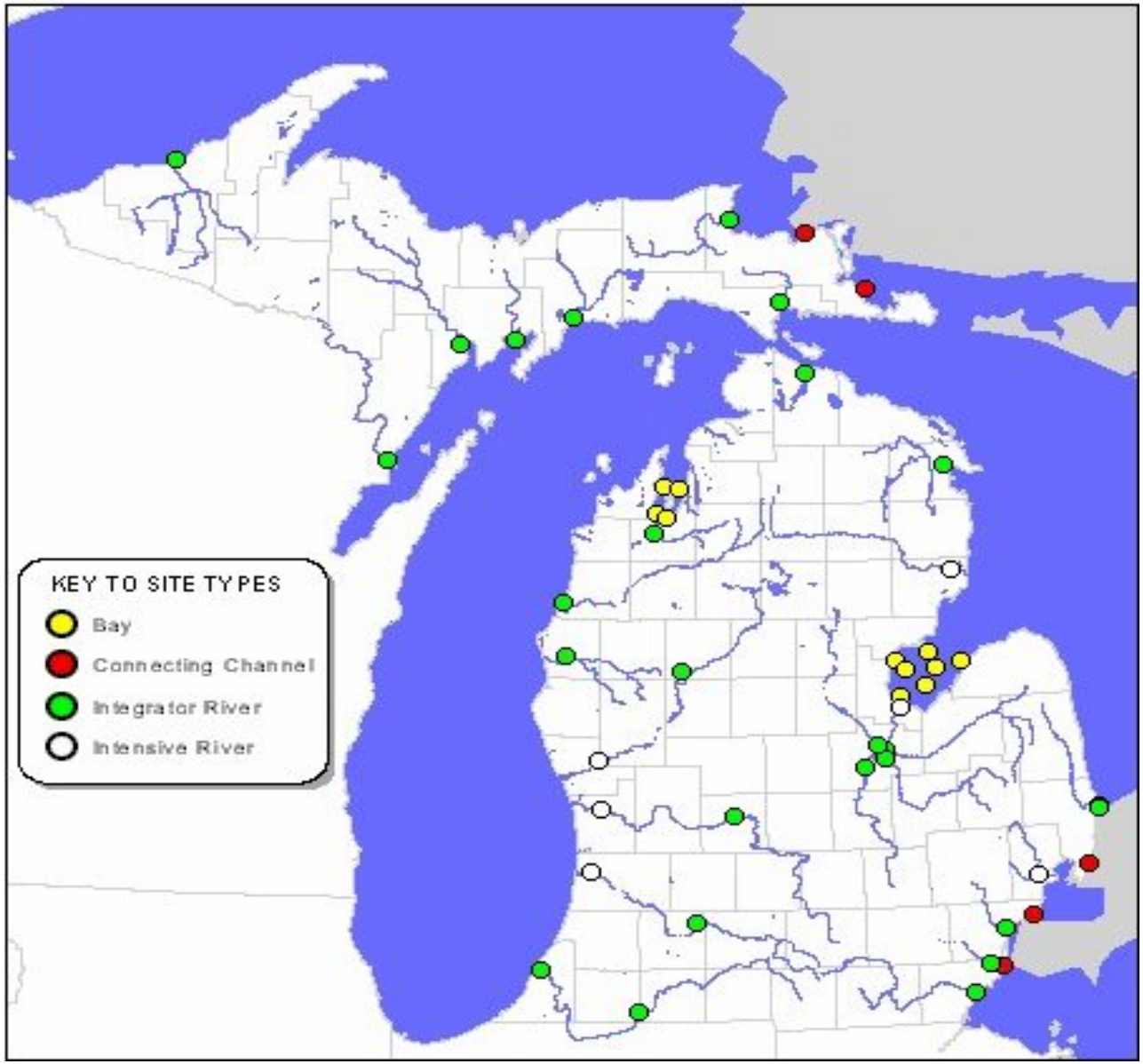


- Proposed CMI Sites

Temporal/Spatial Trends

- Fixed Station
  - water, fish contaminants, wildlife contaminants
- Targeted sites
  - sediment

Water chemistry trend monitoring locations in Michigan (Bay, Connecting Channel, Intensive, and Integrator types).



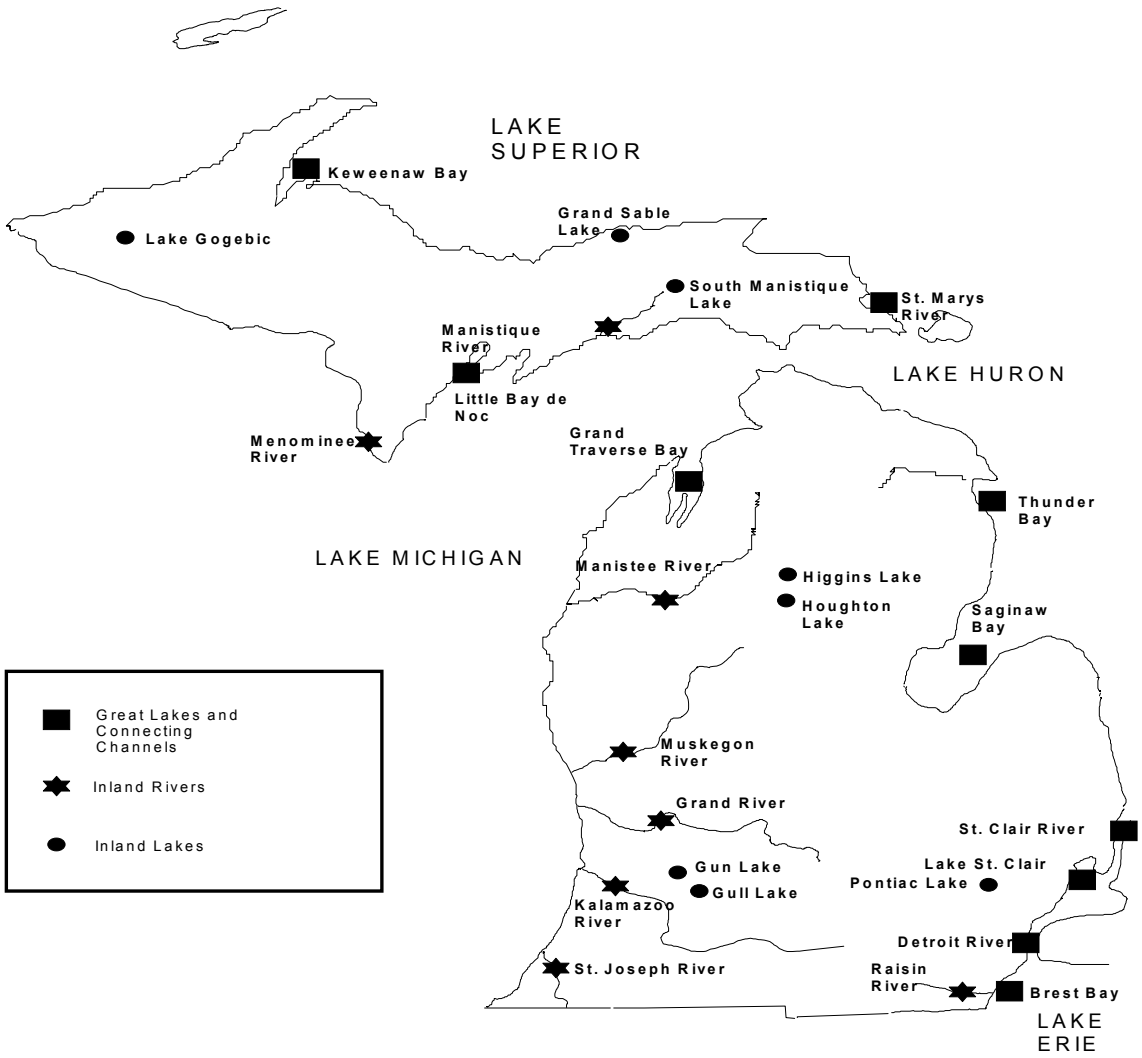
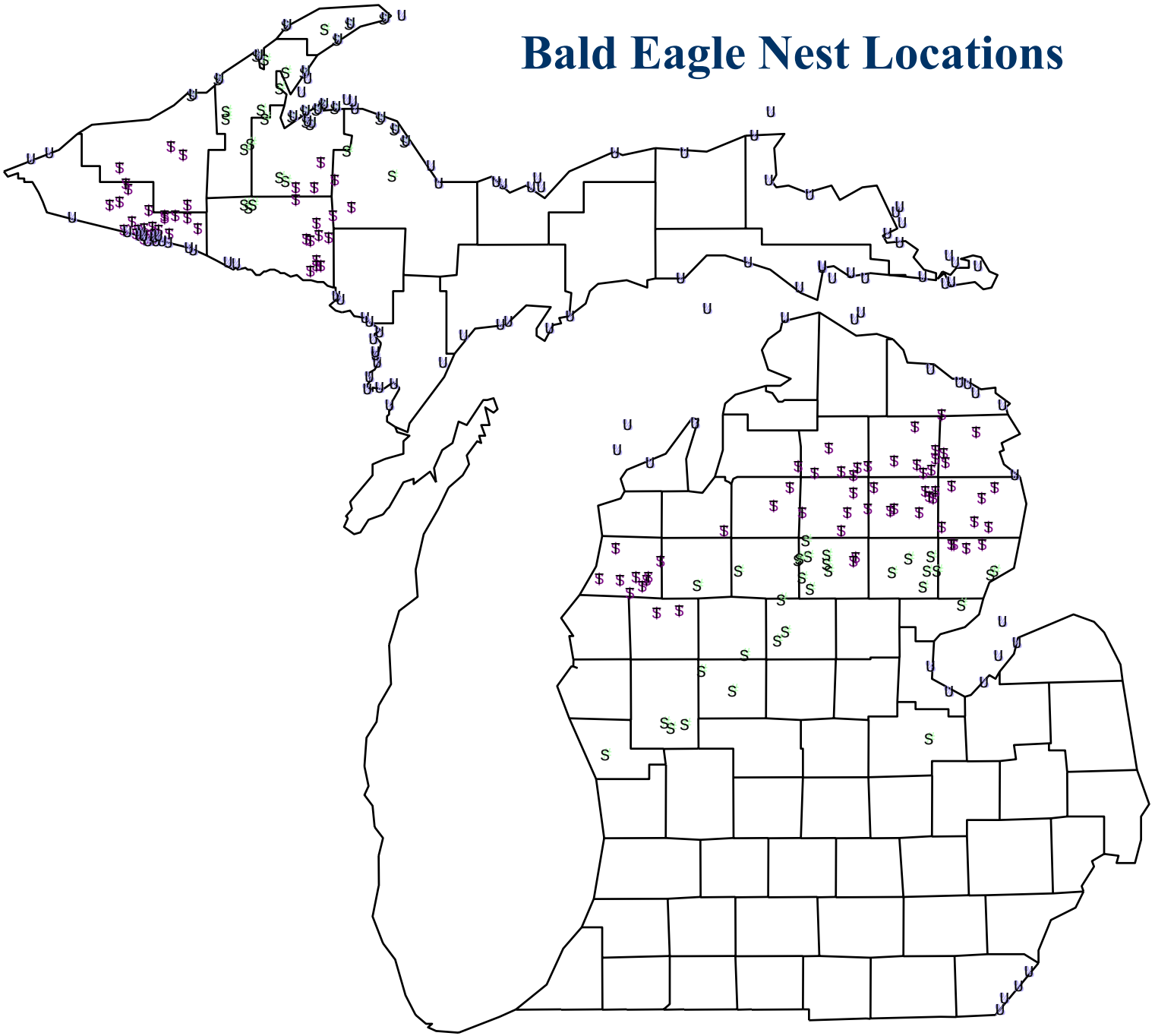
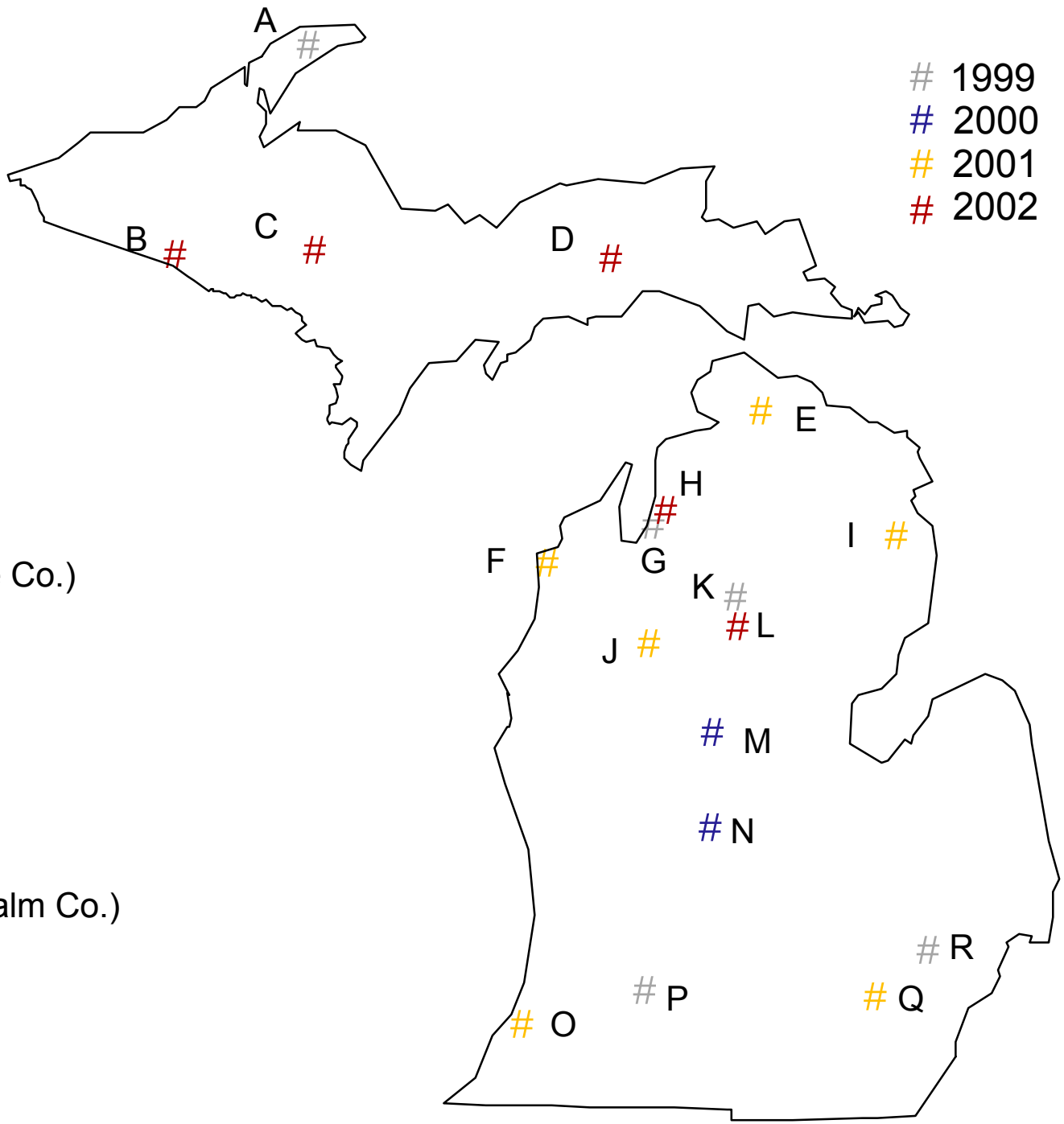


Figure 2. Michigan Fish Contaminant Monitoring Program whole-fish trend monitoring sites.

Bald Eagle Nest Locations



Sediment Trend Lakes



A. Gratiot Lake
B. Imp Lake
C. Witch Lake
D. Round Lake
E. Burt / Mullett Lake
F. Crystal Lake (Benzie Co.)
G. Elk Lake
H. Torch Lake
I. Hubbard Lake
J. Lake Cadillac
K. Higgins Lake
L. Houghton Lake
M. Littlefield Lake
N. Crystal Lake (Montcalm Co.)
O. Paw-Paw Lake
P. Gull Lake
Q. Whitmore Lake
R. Cass Lake

Program Effectiveness

- Targeted/Special Studies
  - water, sediment, biological, fish contaminants

- Examples
  - NPS Strategy being developed
  - CREP monitoring
  - evaluation of BMPs
  - NPDES
  - TMDL development/implementation

Emerging Issues

- Screening
  - water, sediment, fish contaminants, wildlife contaminants
- Grants/Pilot Studies
  - external organizations

Incorporation of Probabilistic Monitoring Design

- DEQ expects to initiate a probabilistic monitoring component in 2004/2005
- Improve ability to assess statewide status/condition, trends, and emerging issues
- Probable for water chemistry, sediment chemistry, and biological integrity
- Possible for wildlife contaminants (bald eagles)